



FOREST SERVICE
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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Slash Cleanup in a Ponderosa Pine Forest

Affects Use by Deer and Cattle

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Slash is commonly cleaned up after logging in many ponderosa pine forests. In general, slash is disposed of in areas of high fire danger, but left undisturbed in areas of little fire hazard.

Slash disposal can affect forest understory. In a ponderosa pine forest of northern Arizona, tree overstory reduction with slash cleanup produced greatest increases in herbaceous vegetation; greatest losses in herbaceous vegetation occurred on areas where there was heavy slash accumulation as well as on areas where tree canopy increased.²

To better coordinate timber management with wildlife habitat and livestock range use, further knowledge of the effects of slash disposal upon understory conditions and animal use is desirable. This report provides some additional information on these effects.

Study Area

Measurements were made on an area logged in 1958 in the Big Springs working circle on the Kaibab National Forest. Timber overstory was dominated by ponderosa pine (*Pinus ponderosa* Lawson). Quaking aspen (*Populus tremuloides* Michx.) was present in widely dispersed patches.

About 40 percent of the net volume of merchantable trees was removed by selective logging. Tree selection was for: (1) high-risk trees (those that might die before the next cut in about 20 years), (2) mature trees that overtopped immature trees of good form and vigor, and (3) immature trees of poor form, quality, or vigor.

A fire-control access road passed through the sampling area. For fire-control purposes, slash was cleared and piled with a bulldozer for about 200 feet on either side of the road immediately after logging. Slash piles were burned in the fall of the following year.

Methods

Paired sample plots were established at 1/10-mile intervals through the sampling

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²Arnold, Joseph F. Effect of heavy selection logging on the herbaceous vegetation in a ponderosa pine forest in northern Arizona. *J. Forest.* 51: 101-105. 1953.

area. One sample plot was located midway in a slash-cleanup strip; the other plot was located on the same compass line, but about 200 feet beyond the cleanup strip.

The sample plot was oriented along a 50-foot tape. The halfway mark on the tape was taken as the center of a 1/10-acre plot for measuring basal area of tree overstory. Slash intercept was measured in hundreds of feet along the tape. Two 1- by 48-foot transects on either side of the tape were clipped at ground level to obtain green weight of herbaceous plants by species. Green weights were converted to dry weights by drying herbage samples for 24 hours at 70° C.

Accumulated deer and cow dropping groups, and aspen sprouts, were counted on transects of 2 by 50 feet on either side of the tape.

Overstory and Slash Comparisons

Tree overstory measured 164 square feet of basal area per acre over slash-cleanup areas, and 136 square feet over undisturbed slash areas. The difference can be accounted for by sampling variation. Hence, attributes

that might vary with both overstory density and slash cover can be ascribed to slash alone.

Slash covered 6.8 percent of the ground where undisturbed (table 1), but only 3.2 percent of the ground where slash was cleared (statistically highly significant).

Most of the slash missed during bulldozer cleanup was in intercept classes of less than 4 inches. Undisturbed slash tended to be in larger intercept classes consisting of tree-tops, cull logs, and discarded butt cuts.

Effect of Slash on Understory Vegetation

Slash cleanup had no measurable effect upon total or class production of understory vegetation:

	Slash cleared (No./200 sq. ft.)	Slash undisturbed (Lbs./acre)
Aspen sprouts	3	3
Shrub herbage	2	1
Sedges	13	16
Perennial grasses	4	3
Forbs	7	7
Total herbaceous	26	27

Table 1. -- Distribution of intercept measurements of slash by classes

Slash intercept class (Inches)	Slash cleared		Slash undisturbed	
	Percent of actual ground cover	Percent in size class	Percent of actual ground cover	Percent in size class
Less than 2.0	1.5	47	2.3	34
2.1 - 4.0	1.2	38	1.6	23
4.1 - 6.0	.3	8	1.1	17
More than 6.1	.2	7	1.8	26
Total	3.2	100	6.8	100

Quaking aspen and Fendler ceanothus (*Ceanothus fendleri* A. Gray) were the only shrubs present. No attempt was made to distinguish among different (possibly three) species of dryland sedges (*Carex* spp.). The most abundant perennial grass was mutton bluegrass (*Poa fendleriana* (Steud.) Vasey). Bottlebrush squirreltail (*Sitanion hystrix* (Nutt.) J. G. Smith), prairie Junegrass (*Koeleria cristata* (L.) Pers.), and pine dropseed (*Blepharoneuron tricholepis* (Torr.) Nash) were present in lesser amounts. Species of forbs included: Wright deervetch (*Lotus wrightii* (A. Gray) Greene), lupines (*Lupinus* spp.), and penstemon (*Penstemon* spp.). Herbage production at this site was extremely low--most ponderosa pine sites yield much larger amounts.

Effect of Slash on Animal Use

Slash cleanup resulted in statistically significant differences in animal use, as measured by accumulated pellet group droppings:

	Slash cleared	Slash undisturbed
	(No. groups/200 sq. ft.)	
Cattle	0.8	0.3
Deer	.2	1.1

Cattle dropping groups were more numerous where slash was cleared, while deer dropping groups were more abundant where slash was undisturbed.

Total or compositional forage variations do not explain the differences in animal use. The physical obstacle of slash may, however, have contributed to use differences. Cattle prefer

areas with lesser amounts of litter.³ Logs and treetops also probably present a greater access obstacle to cattle, while deer may feel more conspicuous in areas cleared of slash. Also, they are known to use rough areas as much as more accessible areas.⁴

Summary and Conclusions

1. An area of ponderosa pine on the Kaibab Plateau, logged in 1958, was measured for differences in tree overstory, slash, herbage production, and deer and cattle dropping groups in 1964. The findings may be unique to the specific conditions: a residual overstory of 136 to 164 square feet of basal area in ponderosa pine where understory herbage production is about 25 pounds per acre.
2. Basal area of tree overstory was the same on undisturbed and slash-cleared areas. There was about twice as much slash on the undisturbed area.
3. Slash clearing had no measurable effect upon total amount or composition of understory vegetation. Forage production was low, however, for ponderosa pine sites.
4. Cattle droppings were more numerous on areas cleared of slash; deer pellet groups were greater where slash was undisturbed.

³Glendening, George E. Some factors affecting cattle use of northern Arizona pine-bunchgrass ranges. U. S. Forest Serv., Southwest. Forest and Range Exp. Sta. Res. Rep. 6, 9 pp. 1944. (Consolidated with Rocky Mountain Forest and Range Exp. Sta. in 1953.)

⁴Reynolds, Hudson G. Effect of logging on understory vegetation and deer use in a ponderosa pine forest of Arizona. U. S. Forest Serv., Rocky Mountain Forest and Range Exp. Sta. Res. Note 80, 7 pp. 1961.